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(71) Applicant and
(72) Inventor: DOBRY, Reuven [US/US]; 87 Rolling Wood Drive, Stamford, CT 06905 (US).

(74) Agents: HAMMOND, Jennifer, H. et al.; Sonnenschein Nath & Rosenthal, Suite 1100, 4520 Main Street, Kansas City, MO 64111 (US).

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(54) Title: MULTI-FUNCTIONAL THERAPEUTIC COMPRESS AND METHODS OF USING THE SAME

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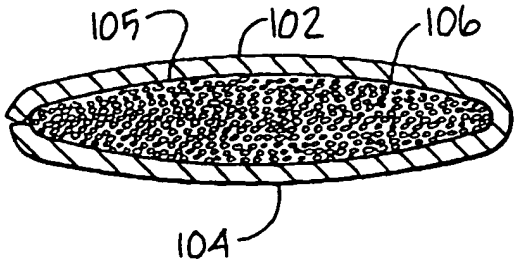

(57) Abstract: Beads of activated alumina with a mixture of glycerol and water absorbed therein are enclosed in a cloth pad which has two functionally different surfaces, one moisture permeable and the other moisture impervious. When the pad is preheated by microwave energy, moist heat is delivered by the moisture permeable surface of the pad and dry heat is delivered by the moisture impervious surface. When the pad is pre-chilled in a freezer, cold is transmitted through its impervious surface. Moisture lost in moist heat applications is replenished automatically by the glycerol, from ambient air, when the pad is not in use.

MULTI-FUNCTIONAL THERAPEUTIC COMPRESS AND METHODS OF USING THE SAME

BACKGROUND OF THE INVENTION

1. Technical Field

This invention relates to products intended for therapeutic heat and cold applications to humans, pets and domesticated animals. More specifically, it is concerned with the efficacy, convenience, versatility and safety of such products.

2. Description of the Related Art

In a typical heating application, agent B receives heat from source A and delivers its heat to load object C. The same applies, in principle, to a cooling application. In that case, agent B receives cold (gives up its heat to) source A and gives up its cold (receives heat from) load object C. Putting it in another way, one may consider the load object of cold as a source of heat and the source of cold as the load object of heat. Thus, intermediate agents play a similar role in heating and cooling.

Topical applications of heat or cold to the body are well known methods of therapeutic treatment for specific conditions. Cold application is usually recommended to reduce swelling and pain associated with minor injuries, sprains, bumps and bruises, as well as minor burns. Heat application is usually beneficial for relief of muscular or skeletal aches, cramps and joint stiffness related to arthritic conditions. Heat treatment also promotes healing and reduces stress and tenseness. Optional forms of heat treatment may be called for and provided with or without accompanying moisture.

Many products are available in the market today that can provide thermal treatments. They are commonly referred to as compresses, heating/cooling pads or, generically, as therming packs. Products of this type usually consist of several basic elements, as follows:

1. A therming agent or therming medium as working payload; a mass of material, liquid or particulate solid, which serves as a source of heat, when preheated, or cold, when pre-chilled.

2. Means of containment for the therming medium, practically and effectively, for its intended uses.

3. Accessory materials and components, outside the means of immediate containment, designed to enhance the performance and usefulness of the products.

Most convenient among such products are a variety of instant packs, which are useable with little preparation. Their therming media or working payloads consist of chemical compositions, sealed in plastic bags, which provide heat or cold by exothermic or endothermic reactions. Thermic reactions include latent thermal effects such as hydration, crystallization and the like. The reactions are triggered by external manipulation of the bags, thereby bringing together chemicals which are held in separate compartments. Most of these products are used once and then discarded. Other products of this general type which deliver heat by a thermic change of state, also triggered by manipulation, can be reused following reconditioning to their original state. In any case, all such products deliver *only* dry heat or cold.

More conventional heating pads, of the electric variety, are well known. They serve as sources of dry heat, with added moisture as an option. The latter is usually provided externally by wetting the outer fabric cover of the pad. Home-based products such as ice bags and hot water bottles deliver cold and dry heat. Here too, moisture can be added externally as an option via moistened towels and the like. Some pads intended exclusively for moist heat application are constructed of absorbent fabric or foam materials. They are simply immersed in hot water or moistened and microwaved before use.

Another group of products is referred to as gel packs. Their working payload consists of aqueous gel compositions, which are permanently sealed in plastic bags. They provide cold after storage in a freezer. They also provide heat after immersion in a hot water bath or microwaving. A few typical gel packs are described in U.S. Patent Nos. 4,910,978, 4,920,964 and 5,129,391. Permanently sealed plastic bags, in some products, are also known to contain other payloads such as clays and semi-solid compositions, which are microwave responsive. These, too, *only* provide cold and dry heat, with moist heat as an option achieved by moistening fabric covers provided with the packs.

An entirely different group of products employs granular or particulate solids as the working payload. The latter are contained, in this case, in bags made of vapor permeable fabrics. The particulates of choice contain a certain amount of water, which vaporizes upon microwaving and passes on to the user. This clearly eliminates the use of such packs for dry heat application. The broad range of such particulates currently in use includes natural grains such as rice, as well as, silica gel and activated alumina. The source of transmittable moisture is either innate, as in grains, or absorbed by the particulate solid. Some of these particulates are capable of replenishing lost moisture by reabsorbing it from ambient air. Thus, the prospective user of the pad is assured a source of moisture without the need to supply it initially or replenish it subsequently from outside sources. One such particulate agent is described in U.S. Patent No. 5,314,005, which was granted to this applicant on May 24, 1994.

Some heating pads containing particulate therming media are also claimed to be suitable for cold applications. However, cold treatment with such pads is not an effective or practicable option for two major reasons. The first reason relates to the payload's limited capacity to store cold. Because the water contained in the particles is not free to

undergo a change of phase upon cooling, the payload is only able to store sensible cold. In other words, it cannot benefit from the latent heat of freezing which, for water, is rather substantial. The second reason relates to the fabrics in which the particles are contained. These fabrics are usually selected to be not only vapor permeable, for the sake of transmitting vaporized water, but also somewhat thermally insulating. Some thermal insulation is desirable in order to shield the user from the heat of the payload, which tends to be rather elevated at least initially. Unfortunately, the same thermally insulating properties of the fabric tend to hinder the transfer of cold, however limited it may be in the first place. Under these circumstances cooling may not be considered a viable option.

In summing up the state of the prior art, it is clear that many compresses presently in use are mono-functional, providing either heat or cold. Others seem to be di-functional at best, providing moist heat and some cold, or dry heat and cold. In many cases, addition of moisture to dry heat must be done externally and repeatedly in order to produce the effect of moist heat. In short, there seems to be ample opportunity for innovation in the area of multi-functionality.

Accordingly, the object of this invention is to provide novel means of containment for particulate heating/cooling agents to enhance their performance. Another object of the invention is to provide a therming pack which is at least tri-functional, capable of delivering cold, dry heat and moist heat, the latter without the addition of water from external sources. A further object of the invention is to make the thermal treatments, which the pack provides effective, directional, energy efficient and safe.

SUMMARY OF THE INVENTION

In the present invention, moisture bearing therming media are retained in cloth pads which have two distinctly different working surfaces, one moisture impervious and the other moisture permeable. The moisture impervious surface of the pad is made of a

thin, thermally conductive coated fabric. The moisture permeable surface of the pad is made of a thicker and somewhat thermally insulating fabric. The latter also extends beyond the edge of the pad to form a flap large enough to cover either surface of the pad as needed.

The pad is either pre-chilled in a freezer or microwaved before use. With the pad pre-chilled, cold is derived from the pad through the moisture impervious surface. With the pad microwaved, dry heat is derived from the moisture impervious surface of the pad, and moist heat is provided by its moisture permeable surface. In short, truly tri-functional performance from one and the same unit is thus possible with this invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top view of the preferred, multi-functional therming compress of this invention.

FIG. 2 is a cross-sectional view of the compress along line AA.

FIG. 3 is a cross-sectional view of the compress along line AA, with the flap doubled over the moisture permeable surface of the pad.

FIG. 4 is a cross-sectional view of the compress along line AA, with the flap extended and covering the moisture impervious surface of the pad.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

This invention is concerned primarily with means of containment for particulate therming media in order to realize their full performance potential in a multi-functional therapeutic compress. Multi-functionality, in this context, means ability to deliver cold or heat, with the latter being, optionally, dry or moist. Multi-functionality, in the broadest sense, also means self-containment or self-sufficiency; ability to perform all of those functions automatically and specifically without the addition of water by the user.

It would be advantageous at this point to consider what properties are required of the particulate therming medium in order to perform the desired functions. First and foremost, it should contain a certain proportion of water and thus be a source of moisture for moist heat applications. For the sake of self-sufficiency, it is essential that the delivery of moisture also be reversible; *i.e.*, self-replenished from ambient sources. Secondly, it should have the capacity to generate and store heat internally for delivery as needed; *i.e.*, be microwave responsive. Thirdly, for the sake of cold applications, it should be capable of storing sensible cold, at least by virtue of its specific heat.

Various particulate therming media, those already in use, might be suitable for this invention. As previously cited, they include the natural grains, which contain water innately, and drying agents, such as silica gel and activated alumina, which contain adsorbed water. Spherical beads of activated alumina serve as liquid absorbents for the particulate heating/cooling agents described in U.S. Patent No. 5,314,005 which are preferred for this invention. The beads contain a mixture of glycerol and water. The glycerol contributes to the specific heat of the particles which is all-important for the storage of heat or cold. Being a humectant and hydrophile, glycerol also promotes the re-absorption of lost moisture from ambient air.

What we have in effect with the mixture of glycerol and water is a system striving to maintain equilibrium with its surroundings. The glycerol is relatively non-volatile and therefore the "permanent" component of the mixture, while the water is volatile and variable. When water is spent in moist heat applications, the glycerol remains behind. Then, while the compress is not in use, the glycerol reabsorbs moisture from ambient air as it strives to reach equilibrium with surrounding humidity. Thus, the compress is prepared for the next use with its moisture content restored.

According to this invention, the particulate therming media are retained in a specially designed therming pad. The pad is assembled from two dissimilar fabrics, one vapor impervious and the other vapor permeable. The fabrics are sewn together to form two distinct working surfaces: one, for our purposes, moisture impervious and the other moisture permeable. The fabrics and corresponding surfaces are colored for easy identification. The moisture impervious surface has different color, for example blue, than the moisture permeable surface, for example white. In a preferred design, the moisture permeable (white) fabric extends beyond the edge of the pad. It forms a flap sized to cover one surface of the pad or the other, as desired, for a particular therming application. This will be covered in greater detail when describing how the compress is to be used.

Turning now to the drawings, FIG. 1 shows a top view of pad 101 with flap 102 fully extended. Also shown are four stitch lines 103 through the surface of the pad. These form five elongated pockets, which retain the particles in place and permit the pad to be bent more easily along the stitch lines. FIG. 2 is a cross-sectional view of the compress through line AA. It shows the particulate payload 106 retained between vapor impermeable fabric 105, forming the moisture impervious surface of the pad, and vapor permeable fabric 104, forming the moisture permeable surface of the pad. Fabric 104 also extends to form flap 102. FIG. 3 shows flap 102 doubled over and covering surface 104. FIG. 4 shows flap 102 extended around the pad and covering surface 105.

The moisture permeable fabric of the pad is, typically, a web of nonwoven polyester. The moisture impervious fabric of the pad consists of a woven nylon fabric coated with a thin layer of urethane polymer. The pad is assembled with the urethane coating inside and the nylon fabric outside. Matching pieces of the die-cut fabrics are

sewn together, filled with the working payload, and finished off with bindings around the edge of the sewn pad and flap.

The compress is used as follows:

For cold treatment, the compress is maintained in a freezer, or pre-chilled therein for at least eight hours. When cold treatment is needed, the compress is removed from the freezer and the moisture impervious (blue) surface is applied directly to the skin with moderate compression. The flap, covering the other surface of the compress, conserves whatever cold is stored therein.

For dry heat application, the compress is microwaved until it reaches an effective working temperature. A compress stored at room temperature obviously requires less microwave time than one removed from the freezer prior to its use. The heated compress provides dry heat through its moisture impervious (blue) surface. If the compress is too hot for direct contact, it may be shielded by the flap initially and then used directly as it cools off. The other surface of the compress may be covered by the user with a towel to conserve heat.

For moist heat treatment, the compress is microwaved to its working temperature, with the flap covering the moisture impervious (blue) surface of the compress. The flap shields that surface for safe handling by the user and conserves the heat stored in the compress. Moist heat is applied from the moisture permeable surface of the pad directly onto the skin or, initially, when hot, through a towel. The towel may be removed later as the compress cools down. Lost moisture is drawn back from ambient air into the pad when the latter is not in use.

The vapor impervious (blue) surface of the pad serves a number of important functions. Firstly, it bars passage of moisture when the latter is not needed; *i.e.*, for dry heat or cold application. Secondly, it sends moisture in the opposite direction, *i.e.*, toward

the moisture permeable (white) surface of the pad, where and when moist heat is desired. Thirdly, its thin gauge and superior thermal conductivity, superior to the other surface of the pad, promotes better heat transfer of cold as well as dry heat.

The flap, too, serves a couple of important functions in the performance of the pad. It shields the user from elevated surface temperatures of the pad when that is needed. It also provides thermal insulation, in other cases, to conserve heat or cold and make them last longer.

It is noteworthy that cold treatments by the compress of this invention are different from and, in some ways, better than pads of the prior art. It is well known that rapid chilling has a numbing effect on the skin at first, which then becomes painful. This is particularly true of direct contact with ice cubes, ice water and some gel packs. That is why some gel packs are provided with sleeves of fabric. Fast cooling at the surface of gel packs also produces surface condensation of moisture from ambient air. This is cited by U.S. Patent No. 4,910,978 as a problem to be contended with. It is, in fact, handled by the sleeve provided with the gel pack or by making the surface floccose or fabric-like.

Cooling provided by the compress of this invention is more moderate and longer lasting because cold transfer occurs between particles of the payload. This slows down the rate of cooling by the pad even upon direct contact with the skin. Cooling is thus maintained and sustained at a moderate rate which is numbing but not painful. As an added, unexpected and welcome benefit, it reduces the incidence of surface condensation, obviating the discomfort and nuisance encountered and cited by the prior art.

Thus, the compress of this invention exhibits true multi-functionality with directional performance enhanced by thermal efficiency, convenience and safety. It does all that with some unexpected benefits as well.

The foregoing description is for the purpose of teaching the person of ordinary skill in the art how to practice the present invention. It is not intended to detail all of those obvious variations and alternatives in choice of structural fabrics and related materials, which will become apparent to the skilled practitioner upon reading the description. It is intended, however, that all such variations and alternatives be included within the scope of the present invention which is defined by the following claims:

What is claimed is:

1. A multi-functional therapeutic compress comprising:

(a) a cloth pouch having two functionally different surfaces, said first surface being moisture permeable and said second surface being moisture impervious; and

(b) a particulate solid containing a source of moisture enclosed in said cloth pouch, said particulate solid capable of storing heat or cold and delivering the same to a load object.

2. The therapeutic compress of claim 1 wherein said source of moisture is absorbed water from the ambient air.

3. The therapeutic compress of claim 2 wherein said particulate solid also contains a substance which possesses humectant/hygroscopic properties.

4. The therapeutic compress of claim 3 wherein said substance is glycerol.

5. The therapeutic compress of claim 4 wherein said water and glycerol are admixed and absorbed in beads of activated alumina.

6. The therapeutic compress of claim 1 wherein the first surface is made of a fabric of nonwoven polyester web.

7. The therapeutic compress of claim 6 wherein the surface is made of a woven nylon fabric rendered impervious by a coating of urethane polymer.

8. The therapeutic compress of claim 1 wherein said compress includes a flap made of the moisture permeable surface to cover the moisture impervious surface of the compress.

9. The therapeutic compress of claim 1, wherein said particulate solid is activated alumina.

10. A method of treating a load object with a compress comprising:

(a) fabricating a compress by enclosing a particulate solid containing a source of moisture in a cloth pad which has two different surfaces, said first surface being moisture permeable and said second surface being moisture impervious;

(b) contacting said compress with said load object, said compress having been treated by the step selected from the group consisting of:

i) pre-chilling the compress in a freezer wherein said load object obtains cold from the moisture impervious surface of the pad; or

ii) preheating the compress by microwave energy, wherein said load object obtains dry heat from the moisture impervious surface of the pad; or

iii) preheating the compress by microwave energy, wherein said load object obtains moist heat from the moisture permeable surface of the pad.

11. The method of claim 9 wherein said particulate solid comprises beads of activated alumina containing a mixture of glycerol and water absorbed therein.

12. The method of claim 10 wherein said glycerol remains in the particulate solid when the compress provides moist heat.

13. A multi-functional therapeutic compress comprising:

(a) A particulate heating/cooling agent containing a self-replenishing source of moisture; and

(b) a cloth pad, enclosing said particulate agent, said pad having two different surfaces, said first surface being a vapor impermeable surface for transmission of cold or dry heat and said second surface being a vapor permeable surface for transmission of moist heat.

14. The therapeutic compress of claim 13 wherein the self-replenishing source of moisture is a mixture of glycerol and water and said particulate containing said mixture consists of spherical beads of liquid absorbent alumina.

15. The therapeutic compress of claim 14 wherein the self-replenishing source of moisture in the particulate agent is achieved by the glycerol component as it strives to reach equilibrium with moisture in ambient air.

AMENDED CLAIMS
[received by the International Bureau on 14 August 2001 (14.08.01);
original claims 1, 2, 6-8, 10-13 and 15 amended; new claims 16-25 added;
remaining claims unchanged (4 pages)]

1. A multi-functional therapeutic compress comprising:

(a) a cloth pouch having two functionally different surfaces, a first surface being moisture permeable and a second surface being moisture impervious; and

(b) a particulate solid containing a self-replenishing source of moisture enclosed in said cloth pouch, said particulate solid capable of storing heat or cold and delivering the same to a load object;

wherein said multifunctional therapeutic compress is capable of delivering either cold, moist heat, or dry heat.

2. The therapeutic compress of claim 1 wherein said self-replenishing source of moisture is absorbed water from the ambient air.

3. The therapeutic compress of claim 2 wherein said particulate solid also contains a substance which possesses humectant/hygroscopic properties.

4. The therapeutic compress of claim 3 wherein said substance is glycerol.

5. The therapeutic compress of claim 4 wherein said water and glycerol are admixed and absorbed in beads of activated alumina.

6. The therapeutic compress of claim 1 wherein said first surface is made of a fabric of nonwoven polyester web.

7. The therapeutic compress of claim 1 wherein said second surface is made of a woven nylon fabric rendered impervious by a coating of urethane polymer.

8. The therapeutic compress of claim 1, further comprising a flap extending from the moisture permeable surface and sufficiently sized to cover either surface of the compress.

9. The therapeutic compress of claim 1, wherein said particulate solid is activated alumina.

10. A method of treating a load object with a compress comprising:

(a) fabricating a compress by enclosing a particulate solid containing a self-replenishing source of moisture in a cloth pad which has two different surfaces, a first surface being moisture permeable and a surface being moisture impervious;

(b) contacting said compress with said load object, said compress having been treated by the step selected from the group consisting of:

(i) pre-chilling the compress in a freezer wherein said load object obtains cold from the moisture impervious surface of the pad; or

(ii) preheating the compress by microwave energy, wherein said load object obtains dry heat from the moisture impervious surface of the pad; or

(iii) preheating the compress by microwave energy, wherein said load object obtains moist heat from the moisture permeable surface of the pad.

11. The method of claim 10 wherein said particulate solid comprises beads of activated alumina containing a mixture of glycerol and water absorbed therein.

12. The method of claim 11 wherein said glycerol remains in the particulate solid when the compress provides moist heat.

13. A multi-functional therapeutic compress comprising:

(a) a particulate heating/cooling agent containing a self-replenishing source of moisture; and

(b) a cloth pad, enclosing said particulate agent, said pad having two different surfaces, said first surface being a vapor permeable surface for transmission of moist heat

and a second surface being vapor impermeable surface for transmission of cold or dry heat.

14. The therapeutic compress of claim 13 wherein the self-replenishing source of moisture is a mixture of glycerol and water and said particulate containing said mixture consists of spherical beads of liquid absorbent alumina.

15. The method of claim 11 wherein said self-replenishing source of moisture is achieved by the glycerol component as it strives to reach equilibrium with moisture in ambient air.

16. A multi-functional therapeutic compress comprising:

(a) a particulate heating/cooling agent containing a source of moisture; and

(b) a non-removable cloth pad permanently enclosing said particulate agent, said pad having two different surfaces, said first surface being a vapor permeable surface for transmission of moist heat and a second surface being vapor impermeable surface for transmission of cold or dry heat.

17. The therapeutic compress of claim 16 wherein said source of moisture is self-replenishing and is adsorbed water from the ambient air.

18. The therapeutic compress of claim 17 wherein said particulate agent contains a substance which possesses humectant/hygroscopic properties.

19. The therapeutic compress of claim 18 wherein said substance is glycerol.

20. The therapeutic compress of claim 19 wherein said water and glycerol are admixed and absorbed in beads of activated alumina.

21. The therapeutic compress of claim 16 wherein said first surface is made of a fabric of nonwoven polyester web.

22. The therapeutic compress of claim 16 wherein said second surface is made of a woven nylon fabric rendered impervious by a coating of urethane polymer.

23. The therapeutic compress of claim 16 wherein said compress further comprises a flap extending from the moisture permeable surface and sufficiently sized to cover either surface of the compress.

24. The therapeutic compress of claim 16 wherein the self-replenishing source of moisture is a mixture of glycerol and water and said particulate containing said mixture consists of spherical beads of liquid absorbent alumina.

25. The therapeutic compress of claim 16 wherein the two different surfaces are different colors.

STATEMENT UNDER ARTICLE 19(1)

I. AMENDMENTS TO CLAIMS

Applicant has amended the independent claims (1, 10, 13) to recite the source of moisture is "self-replenishing" and the meaning of "multifunctional."[1] In addition, Applicant has added a set of new claims (16-25) which recite that the cloth pad having two distinct surfaces is "non-removable" and "permanently" encloses the particulate agent. No new matter is added by these amendments.

II. REFERENCES CITED IN INTERNATIONAL SEARCH REPORT

A. U.S. 5,179,944 (McSymytz)

The McSymytz Patent discloses a therapy pad having several water-permeable fabric pockets (15, 16) containing sand. The container may be immersed in water (25) by the user and then either heated in a microwave oven (26) or frozen in a freezer (27). See 4/1-2. To prevent burning of the skin (see 5/12-14), a two-sided cover (30) is placed over this primary containment system for the thermal medium during use. The top side of the cover is comprised of padding (37) and fabric (36). The bottom side of the cover is comprised of padding (42), fabric (44), and a moisture impermeable layer (46).

The McSymytz Patent differs from the claimed invention in at least two major respects. First, the thermal medium (sand) obtains water from the user; it is not self-replenishing. Second, the moisture impermeability of the device is obtained from a "removable" separate cover; the permeability/impermeability is not controlled by a non-removable permanent containment system.

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[1] "Multi-functionality" means the ability to deliver (1) cold, (2) dry heat, or (3) moist heat. See page 5, lines 21-22.

B. U.S. 5,031,418 (Hirayama)

The Hirayama Patent differs from the claimed invention in several material respects. The device is not "multifunctional"; it is directed to a "cooling" pack. The thermal medium involves liquid absorbent polymer particles (13) dispersed and fixed on a liquid-absorbent substrate (12). The specification describes that when a plurality of packs are stacked in a cooling apparatus, the containers stick together as residual liquid held in the nonwoven fabric is frozen. To solve this problem, FIG. 3 shows a container (11) comprised of a liquid impermeable sheet (15(a)) and a liquid permeable sheet (16).

Unlike the claimed invention, the Hirayama Patent's device does not provide selective and directional vapor permeability/impermeability for the delivery of (1) cold, (2) dry heat, or (3) moist heat. There is also no self-replenishing source of moisture.

C. U.S. 5,314,005 (Dobry)

Applicant's present invention is an improvement on this prior patent by the same inventor – the Dobry Patent '005. The '005 Patent is directed to particulate heating/cooling agents. There is no teaching or suggestion to place such agents in a cloth pouch having two functionally different surfaces in order to achieve a "multifunctional" compress.

D. U.S. 5,211,949 (Salyer)

The Salyer Patent is directed to device that provides only dry heat and cold. The thermal medium is comprised of silica (6) and phase-change materials housed in a "liquid impervious enclosure." Water is neither lost nor replenished when the wraps are used as recited in the claimed invention.

III. CONCLUSION

Applicant respectfully requests entry of the above amendments and consideration of Applicant's claims in view of the above Statement.

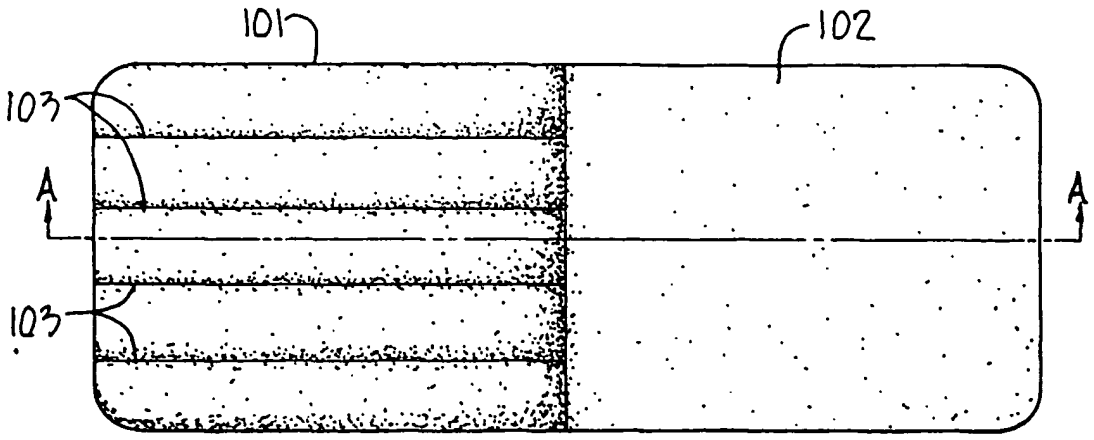

Fig. 1

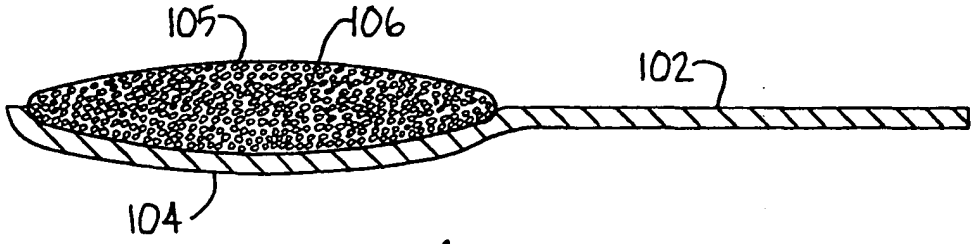

Fig. 2

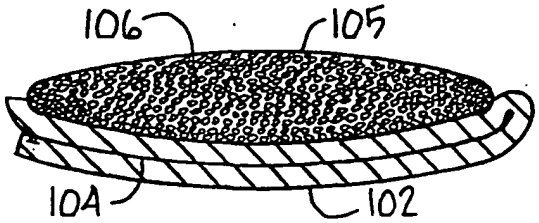

Fig. 3

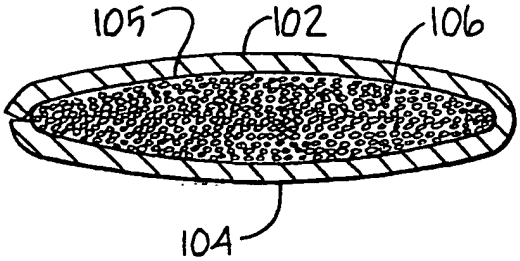

Fig. 4

INTERNATIONAL SEARCH REPORT

Inter Application No
PCT/US 00/10115

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61L15/18 A61L15/42 F28D20/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A61L A61F F28D F28F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 179 944 A (MCSYMYTZ LAURIE L) 19 January 1993 (1993-01-19) column 2, line 16 - line 65; claim 1	1-3,10
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☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
8 December 2000	18/12/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax (+31-70) 340-3016	ESPINOSA, M

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